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Strategies for Understanding Information Organization in Discourse

Susan R. Goldman
University of California, Santa Barbara

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Abstract

The strategies of native and nonnative English speakers reading informational, texts were examined. The texts differed in the degree to which information was explicitly signalled by rhetorical devices such as *first, second,* and *third.* Students read a series of passages presented on a microcomputer, one sentence at a time. From traces of students' progress through the text, including time and the sequence in which sentences were read, we categorized each passage in terms of three Global Strategy types and ten local, backtracking strategies. All individuals but one used multiple global and local strategies across the 8 passages they read. Although the signalling affected memory for the signalled information, strategies were not systematically related to this variable. Rather, when both native English and nonnative English speakers were trying to understand these texts, they appeared to use a series of decision rules that encompass local and global, structural and semantic aspects of text. Suggestions are made regarding the nature of these decision rules and their implications for understanding text processing in complex content domains.

Strategies for Understanding Information Organization in Discourse

The focus of my talk today is the reading strategies people use for understanding the organization of information in text. We know that texts differ in the degree to which their organization is made obvious to the reader. These differences influence how people read and later remember the presented information (e.g., Britton, Glynn, Meyer & Penland, 1982; Lorch & Chen, 1986; Lorch & Lorch, 1986; Mayer, Dyck, & Cook, 1984; Meyer, & Rice, 1981). The organization of a text is often signalled by various rhetorical devices (Meyer, 1975). One of the most important types of rhetorical devices signals the logical connections between pieces of information. Within the general class of logical connectors several different relations are possible. For example, information may be sequentially related, as in a sequence of steps or facts all related to one particular theme or topic. Connectors that signal such relations are next, first, finally, etc.

In acquiring English as a second language (ESL), one skill that students need to acquire is the ability to recognize the value of explicit markers and to use these markers to guide their processing of text. The research I'll talk about today began as an effort to look at the effects of sequential markers on the reading strategies and retention performance of college-level native English speakers and of college students acquiring English as a second language - ESL students. Of particular interest was whether the effects of explicit markers was similar for ESL students and for native, English speakers. Although some investigators have found that reading behavior of ESL students is more reliant on graphic cues in text (as compared to semantic, contextual information) than is that of native English speakers (McLeod & McLaughlin, 1986), other evidence indicates that the comprehension strategies of ESL college students are similar to those of native English speakers (Block, 1986). Our own work

dealing with the question answering strategies of a small number of ESL and monolingual English students indicated that ESL students tended to rely more heavily on the text than did monolingual English students (Goldman & Durán, 1987). However, the verbal protocols that we collected suggested that sequence markers were noticed by both types of students. There are three points I want to make in today's talk:

1. We found the expected effects of the markers on recall and reading time.

2. For the most part, the strategies used by the ESL and by the native English speakers were the same.

3. There was considerable variability within individuals in their reading strategies. This variability suggests that readers use a series of decision rules that encompass local and global structural and semantic aspects of text.

Although it had been my intention to discuss a second study on three other types of connectors, I'll discuss only the sequence marker study today.

For the sequence marker study, we selected relatively short passages (approximately 400 words in length) from a variety of introductory level textbooks in the social and behavioral sciences. We modified the passages to each include four target points. Students were presented with two passages in each of 4 conditions that varied the degree of explicit marking of the points. Each version had a three sentence introduction, a 3 sentence conclusion and 4 points, each elaborated by 2 additional sentences (Table 1). In the "Full" signalling condition (Full), the topic sentence in the passage explicitly provided the number of points to be discussed (shown in Table 1). Then each point was introduced by the appropriate specific numerical marker, e.g., "First", "Second", "Third", "Fourth". Each target point was followed by two sentences that elaborated it. Then the next point was made, e.g., Second..., followed by its two elaborations. In the "Number", the topic sentence explicitly provided the number of points to be discussed. However within the body of the text, the individual points were

not enumerated. The "Vague" condition was identical to "Number" except that a vague quantity term was used instead of the specific number, e.g., several. In the "No" signalling condition, the topic sentence contained no reference to the number of points to be discussed and did not enumerate any of the individual points. For the text in Table 1, the topic sentence read *Plato was concerned with basic issues.*

Students read the texts on a Macintosh computer using a program that presented one sentence at a time. They could go back and forth in the text. Each student read 8 passages and was asked to recall the points from each passage: The topic sentences from the None condition were used to cue recall of the target points, e.g., <u>In the passage about the Ideal State, what were the basic issues that concerned Plato?</u> There were 16 native English speakers and 16 ESL speakers.

With respect to retention, the signalling manipulation had the predicted effect, as the data in the next graph show (Figure 1): For the native English and for the ESL speakers, recall in the full signalling condition was better than in the other three conditions. Similarly, the amount of time spent processing each word reflected the marking manipulation (Figure 2): More time was spent on the passages with the explicit marking. Given that we obtained the predicted effects of marking, we turned to an examination of the reading strategies. Our general expectations were that we ought to find a relationship between what was marked and students' reading time and choice of text segments to reread. These predictions were not really borne out by the data. However, a number of interesting findings did emerge regarding the identification of reading strategies, variability within individuals and between-group comparisons. I'll spend the rest of my time discussing these and the implications of our findings for reading strategy choices.

To examine the specific strategies, we used the traces of the students reading and identified three types of global strategies and a variety of local strategies. The next several overheads show the global strategies. Type 1, shown in Figure 3, is a

straightforward, sequential reading of each sentence in the text from start to finish. Each sentence was read once and when the end of the passage was reached, the subject quit reading and went on to the next passage. In contrast, Types 2 and 3 each involve going back and rereading various sentences in the text. Type 2, shown in Figure 4, involves a straight through read of the passage to the end (as in Type 1), followed by rereading of some or all of the passage. Type 3 (Figure 5) involves backtracking prior to reaching the end of the passage on the first pass through it. Once the end of the passage was reached, the subject might quit **or** go back and reread additional parts of the passage.

Each of the subject's eight passages were categorized as Type 1, 2, or 3 and proportions for each subject of each strategy type were computed. With respect to the issue of whether different strategies were associated with the different signalling conditions, there was no effect of condition. That is, of the total number of passages that were read with a Type 1 strategy, they were spread evenly across the conditions; similarly for Type 2 and 3. This was true for both ESL and monolingual English readers. The next overhead shows the mean proportion of passages in each strategy type for each language group (Figure 6). Both ESL and Monolingual English students most frequently used Type 3 - backtracking during initial reading of the passage. The ESL students were somewhat more likely to use Type 2; the native English Type 1. However, all but one students used more than one type of approach. We classified each subject in terms of the 8 possible patterns of strategy use combinations (Only Type 1, only Type 2, Types 1 & 2, etc.) and found that the native English speakers and the ESL speakers behaved similarly: about a third of the students used all three strategies. We also determined for each student whether there was a dominant strategy, defined as using the same strategy on at least 5 of the 8 passages. Among the ESL students, 12 of the students had dominant strategies and

67% showed dominance of the Type 3 strategy. For the native English speakers, 9 had a dominant strategy and 55% showed dominance of the Type 3 strategy.

Thus, the global strategy data indicate that all the students varied the way in which they read the texts. But this variation was **not** related to the structural manipulation that we had done: Type 3 strategy was just as likely for Full signalling passages as for No signalling passages. We pursued the reading strategies further to determine what sorts of structural and semantic/conceptual characteristics of the passage **were** guiding the reading behavior.

We identified ten local or backtracking strategies, as shown in Figure 7. These local strategies are ways of describing the reader's movement through the text on a sentence by sentence level and capture patterns of forward and backward movement through the text. The ten represent two dimensions of reading behavior: whether people read or skimmed and how much of the text they covered in the process of backtracking. In this figure, heavier lines indicate reading, lighter lines indicate skimming. Closed circles represent reading a single sentence.

The first four strategies (A, B, C, & D) reflect movement through the text in one direction over a relatively long string of sentences. Strategies A and B involve sequential movement through the passage over at least 15 consecutive sentences; A involves reading those sentences, B skimming. Strategy A implies a general desire to reread most of the text, either from beginning to end or vice versa. Strategy B was typically used to return to the beginning of the passage prior to going through it again from the beginning. Strategies C and D reflect the use of both reading and skimming over segments at least 12 sentences long. In C, readers skim one or more sentences, read a sentence, continue skimming one or more sentences, then read a sentence. In D, readers skim one or more sentences, read several sentences, resume skimming, then read several sentences, etc.

The other six strategies reflect backtracking in which readers reverse the direction of their progress through the text, using a combination of reading and skimming and covering relatively short runs of sequentially ordered sentences (2 to 11). Strategy E we refer to as a local rereading strategy: the reader is reading along but goes back and rereads the prior sentence before continuing to read. Use of E suggests that readers need clarification of a just-prior sentence before going on in the passage. The remaining five strategies did not occur with any great frequency in these data so I won't go into detail describing them. Briefly, they involve backtracking by reading or skimming 2 to 11 sentences prior to resuming the original direction of reading. Each of these strategies seems to reflect the readers desire to go back and clarify material prior to continuing on in the passage. The strategies differ primarily in terms of the portions of the passage that are read as compared to skimmed.

The frequency distributions of the local strategies were similar for the two language groups but varied with the type of global strategy. Figure 8 shows the distribution for Type 2 global strategy passages. The four single direction strategies - A, B, C, & D- accounted for 80% of the local strategies. Thus, backtracking behaviors that occurred after reading the passage through once tended to involve returning to the beginning or near beginning of the passage (data for B) and going through the passage again either by reading each sentence (data for A), or by selecting certain groups of sentences to read (data for D). Thus, even after getting through the passage once, additional inspection of the text did not tend to involve local rereading strategies that interrupted movement in a single direction (none greater than 10%).

In contrast, the local strategies used in reading the Type 3 passages reflect a relatively high incidence of backing-up-to-go-forward, as shown in Figure 9. Separate distributions are shown for strategies occurring prior to reaching the end of the passage the first time and for those occurring in any subsequent re-inspection of the text. The local backtracking strategy - E - accounted for 55% of the backtracking for

these passages for both ESL and Native English speakers. On these passages, students appeared to be trying to resolve comprehension difficulties and resolve coherence relations prior to taking in additional new information from the passage. The strategy A frequency indicates that about 15% of the time the local backtracking occurred either at the beginning (first 4 or 5 sentences) or end of the text (last 4 or 5 sentences) and then students read straight through the remainder of the text. After the first time through the passage, (bottom figure) the distribution of local strategies was quite variable but generally indicated a greater reliance on skimming the text, with selected rereading of sentences and segments of the text (reflected in the greater frequencies of strategies B, D, and J).

From the processing time data we saw that ESL students took longer to read the passages than the native English speakers. However, they were also engaged in active reading behaviors during this time and these behaviors were highly similar to the strategies used by the native English speakers. It seems reasonable to conclude that the longer time per passage was largely due to the ESL students requiring more time than the native English speakers to execute similar processing strategies.

In addition to the global and local strategies, the time graphs were used to examine a second set of questions about the relationship between text characteristics and reading behaviors. In particular we were interested in which sentences caused people to change the direction of their reading. Essentially, direction changes indicate the beginning and end points of backtracking behavior. Direction changes can be examined independently of the local strategies and are informative with regard to how structural and semantic aspects of text govern reading behaviors. Structural aspects of the text are things like beginning, ending, and explicit rhetorical markers, such as our enumeration terms. We were particularly interested in whether explicit enumeration of the target points was an important cue to backtracking. Semantic

aspects refer to various processes that must occur to achieve coherence, e.g., resolution c: anaphor, construction of bridging inferences, etc.

The types of sentences that initiated direction changes were again similar for the ESL and Native English speakers but differed across the global strategies. For Type 2 strategies, about 70% of the direction changes were related to a structural characteristic of the text - reaching the end or beginning of the passage (Figure 10). The topic sentence and the target points accounted for less than 20% of the direction changes. In further support of structural importance are the data showing that the tendency for target points to initiate direction changes was strongest if they were explicitly marked (Full condition). This was true for the ESL students but for the native English speakers, the semantic properties of the target points seemed to be sufficient to cue direction changes.

For the Type 3 passages (Figure 11), direction changes that occurred before getting to the end of the passage were governed more by semantic than structural properties: while direction changes were initiated by the target points far more frequently than in Type 2, the semantic properties of the target points seemed to be sufficient to initiate the direction change in both groups of students: about 60% of the target points initiating direction changes were in the unmarked conditions (Number, Vague and None). This trend was true for both the ESL and the native English speakers.

Finally, for the Type 3 passages after reaching the end of the passage the first time, direction changes appeared to be related to more structural properties of the texts: about 50% were initiated by reaching the beginning or end of the passage (Figure 12). The structural cue of marking was important for the native English speakers: explicitly marked target points accounted for 60% of the direction changes cued by the target points. This tendency was not present in the ESL students' data.

Thus, the direction changes were cued by structural and semantic properties of the texts, depending on the particular global strategy that the students were using. We also found that both structural and semantic aspects of the text were related to the sentences that students strategically selected to reread. These data are shown Figure 13 for one of the global strategies. In Type 3, Before about 65% of the strategically read sentences were in the introduction or were target points. Once again, explicit marking of the points was not necessary for them to be singled out for selective rereading. Furthermore, the points elaborating the targets were strategically reread almost as much as the target points: because these elaborations were not structurally marked and are at the lowest level in a content structure, they imply strategic rereading guided by semantic concerns.

These data indicate that both the semantic and structural properties of the text govern the way people read and recall informational texts. We can begin to offer some decision rules that might underlie students use of one or the other of these strategies. Some examples of such decision rules for are the following:

- If a sentence is semantically difficult, reread. May be due to cohesion, vocabulary, syntactic complexity.

- If a sentence is marked structurally for importance, reread (can be marked by rhetorical device or by being at the beginning or the end)

- If a sentence is semantically central, reread - depends on discourse structure

- If a sentence is higher in the content hierarchy assign greater importance.

- If a sentence is elaborated it is higher in the content hierarchy.

The empirical literature on text processing shows that each of these "rules" does indeed affect what and how people understand text. These rules are related to both structural and semantic aspects of text. But in the context of the **whole** task, the set of decision rules operates. The task before us is to understand how the entire set of decision rules operates to produce the observed types of within and between individual differences in reading strategies.

References

Block, E. (1986). The comprehension strategies of second language readers. *TESOL Quarterly, 20*(2), 463-494.

Britton, B. K., Glynn, S. M., Meyer, B. J. F., & Penland, M. J. (1982). Effects of text structure on use of cognitive capacity during reading. *Journal of Educational Psychology, 74,* 51-61.

Goldman, S. R., & Durán, R. P. (in press). Answering questions from Oceanography texts: Learner, task and text characteristics. *Discourse Processes.* (Previously published as Cognitive Science Technical Report #8718, (1987) Santa Barbara, CA: Center for the Study of Spatial Cognition and Performance.)

Lorch, R. F., & Chen, A. H. (1986). Effects of number signals on reading and recall. *Journal of Educational Psychology, 78,* 263-270.

Lorch, R. F., & Lorch, E. P. (1986). On-line processing of summary and importance signals in reading. *Discourse Processing, 9,* 489-496.

Mayer, R. E., Dyck, J., & Cook, L. K. (1984). Techniques that help readers build mental models from scientific text: Definitions pretraining and signalling. *Journal of Educational Psychology, 76,* 1089-1105.

Meyer, B. I. F. (1975). *The organization of prose and its effects on memory.* Amsterdam: North-Holland Publishing Company.

Meyer, B. J. F., & Rice, G. E. (1981). Information recalled from prose by young, middle, and old adult readers. *Experimental Aging Research, 7,* 253-268.

McLeod, B., & McLaughlin, B. (1986). Restructuring or automatization? Reading in a second language. *Language Learning, 36,* 109-126.

Table 1. Example Text for Sequence Marker Study

The Ideal State

Plato was concerned with achieving systematic unity of a society. He did not believe that the primary role of the state was to ensure a feeling of well-being in each one of its participants. According to his theory, the state is a permanent organization that, as a whole, has definite needs and a definite inner structure, and goals that are higher than that of making individuals happy. In his reflections on society, Plato was concerned with four basic issues. **First**, he was convinced that increasing individualization threatened the social order. His model of the ideal state provided for numerous measures that would ensure the citizens' conformity, both in their public behavior and in their thoughts and feelings. He provided for supervision and control of all aspects of individual life. **Second**, Plato's conception of the state addressed the problem of the division of labor and specialization. He argued that no human being was self-sufficient and so the coexistence of human beings must be based on mutual exchanges of services. The individual and the state would each attain wholeness and prosper only if labor was divided so that each man did the task for which nature had designed him. **Third**, Plato attached great importance to the optimal size of a city. He thought that the city could be either too small or too large, and he actually fixed the optimum population of the Greek city at 5,040. He strongly believed that excessive territorial expansion and increased population of the state posed a particular threat to its unity. **Fourth**, he attached great significance to the problem of differentiation of wealth within the society. He saw increasing social inequalities as a major source of decomposition of the state because it led to the interests of small groups being put before the interests of the society. He argued for the abolition of private property and the family, regarding both as prime sources of the problem. Plato viewed society as an interdependent system made up of many parts possessing their own interests. He was interested in social facts insofar as they had definite consequences for the integration or disintegration of society. Above all, he was concerned with discovering conditions that were conducive to social integration and equilibrium.

[a]The bold-faced number terms appeared only in the Full signalling condition. In the Number condition, the underlined term (four) was included. In the Vague version, a vague quantifier (e.g., several) replaced the underlined term. In the None condition, the quantifier term was deleted from the topic sentence.
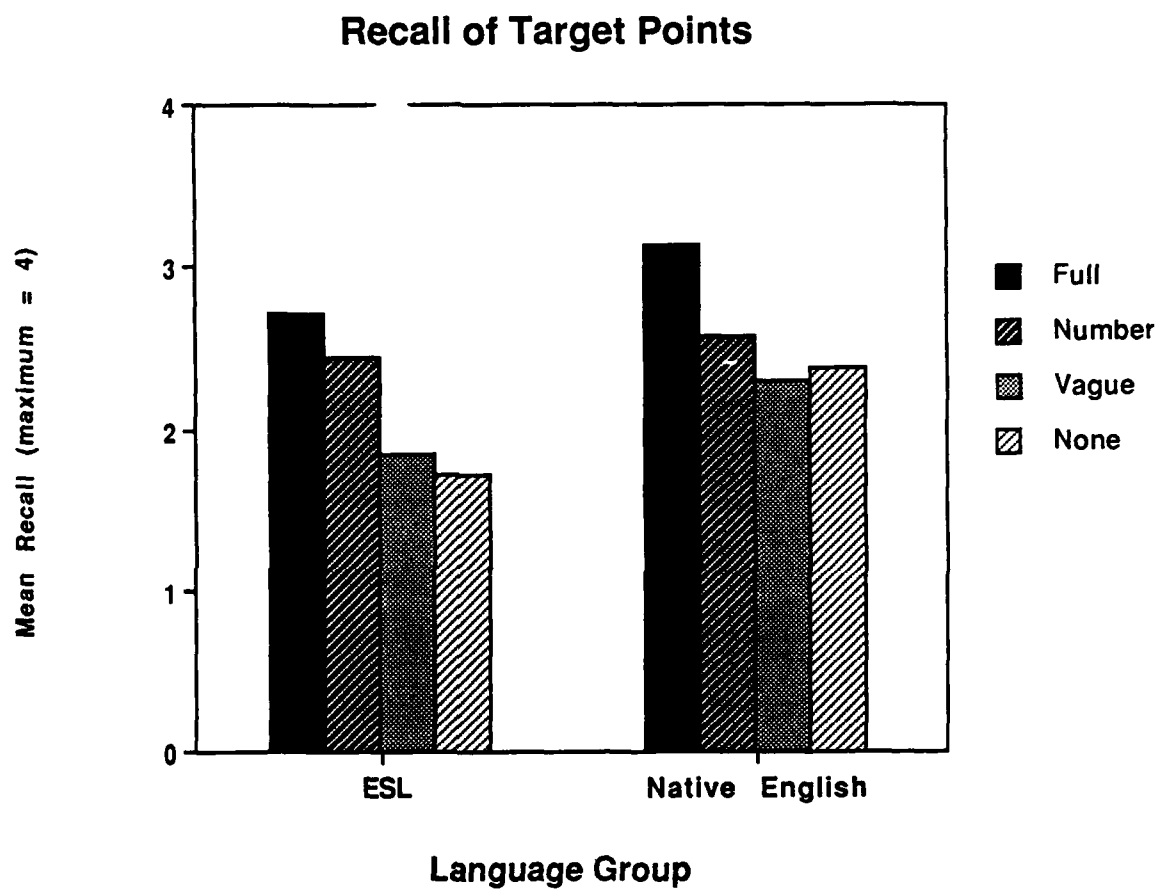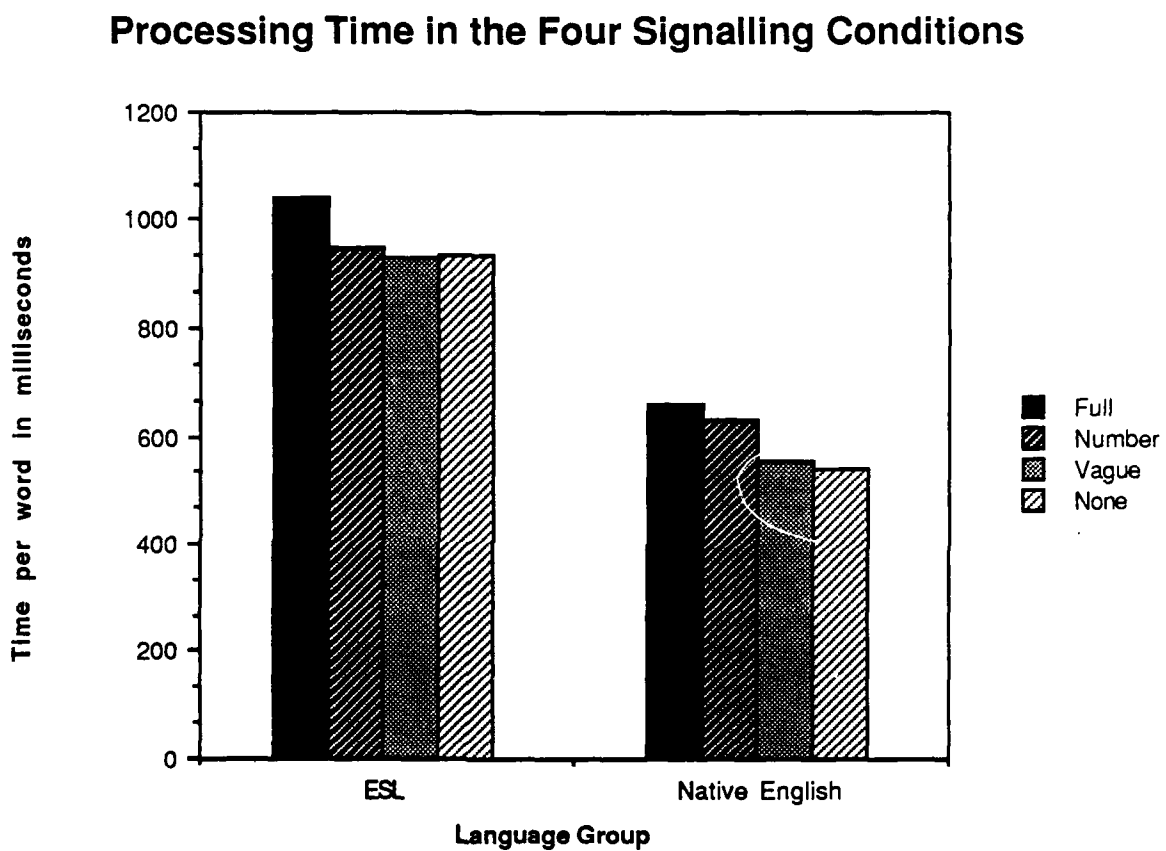
Figure 1.

Recall of Target Points

Figure 2.

Processing Time in the Four Signalling Conditions

Figure 3. Type 1 Global Strategy

SEG	MARKER	TIME/READING ORDER
1	I1	8.183
2	I2	5.467
3	I3	7.183
4	TS	5.083
5	P1	5.533
6	P1.1	5.033
7	P1.2	8.450
8	P2	12.517
9	P2.1	4.933
10	P2.2	3.200
11	P3	4.167
12	P3.1	5.083
13	P3.2	5.900
14	P4	12.300
15	P4.1	8.717
16	P4.2	5.467
17	F1	19.533
18	F2	9.717
19	F3	8.400

PASSAGE #13: Pattern Recognition of Speech Signals

Figure 4. Type 2 Global Strategy

1	I1	9.267	4.033		
2	I2	6.783	1.983		
3	I3	6.717	1.817		
4	TS	4.450	2.233		
5	P1	4.767	1.350		
6	P1.1	0.500	1.133		
7	P1.2	7.950	1.333		
8	P2	5.033	3.517		
9	P2.1	4.317	2.767		
10	P2.2	10.617	8.117		
11	P3	4.067	3.333	6.450	
12	P3.1	8.600	5.333		
13	P3.2	19.533	1.967		2.100
14	P4	4.783	6.800		5.367
15	P4.1	7.383			13.367
16	P4.2	7.550			8.367
17	F1	7.583			2.817
18	F2	7.750	7.683		4.667
19	F3	5.333			3.300

PASSAGE #8: Location

Figure 5. Type 3 GLobal Strategy

1	I 1	17.400	6.467	
2	I 2	2.317	7.833	
3	I 3		12.817	
4	TS		4.767	
5	P1		9.500	4.867	4.167
6	P1.1		22.600	2.850	2.967
7	P1.2		3.833	1.983	1.200
8	P2			16.367	3.967
9	P2.1			7.883	1.617
10	P2.2			7.250	2.650
11	P3			14.583	2.267
12	P3.1			11.483	0.967
13	P3.2			9.617	1.483
14	P4			7.600	0.883
15	P4.1			4.717	2.050
16	P4.2			5.250	1.167
17	F1			8.733	1.133
18	F2			15.367	2.283
19	F3			20.700	2.533

1.250   1.083

PASSAGE #16: The Nineteenth Century

Figure 6

Proportion of Passages Read with Each

Type of Approach by Each Language Group
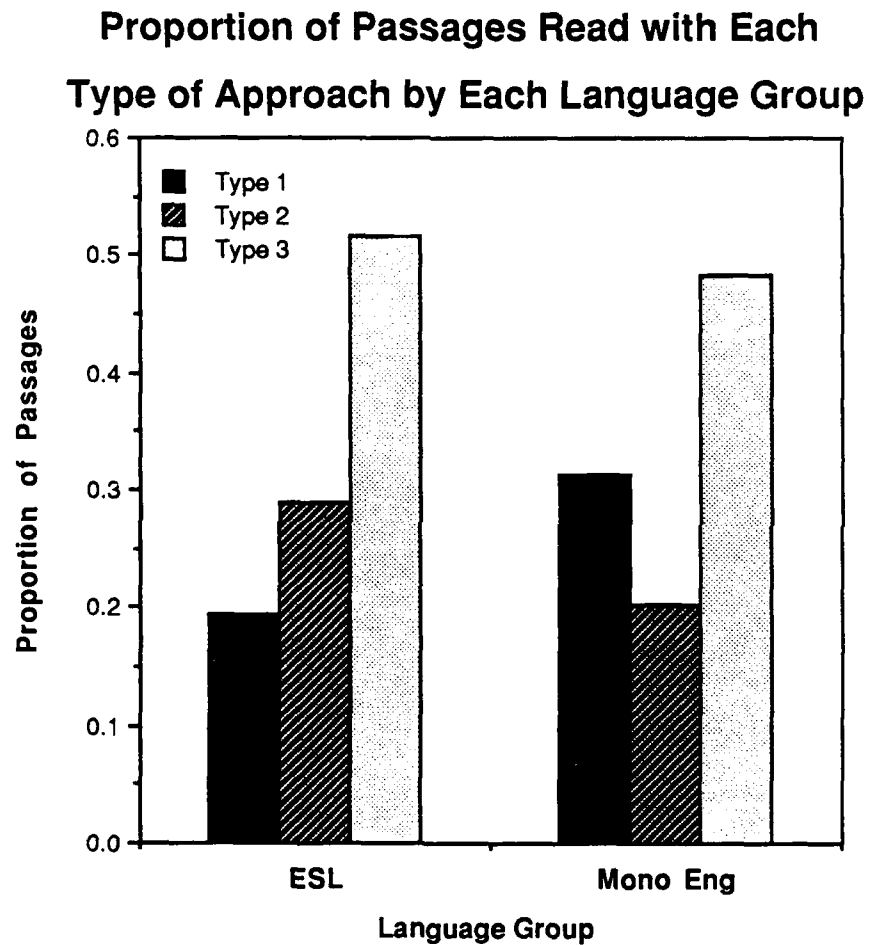
Figure 7. Ten Local Backtracking Strategies
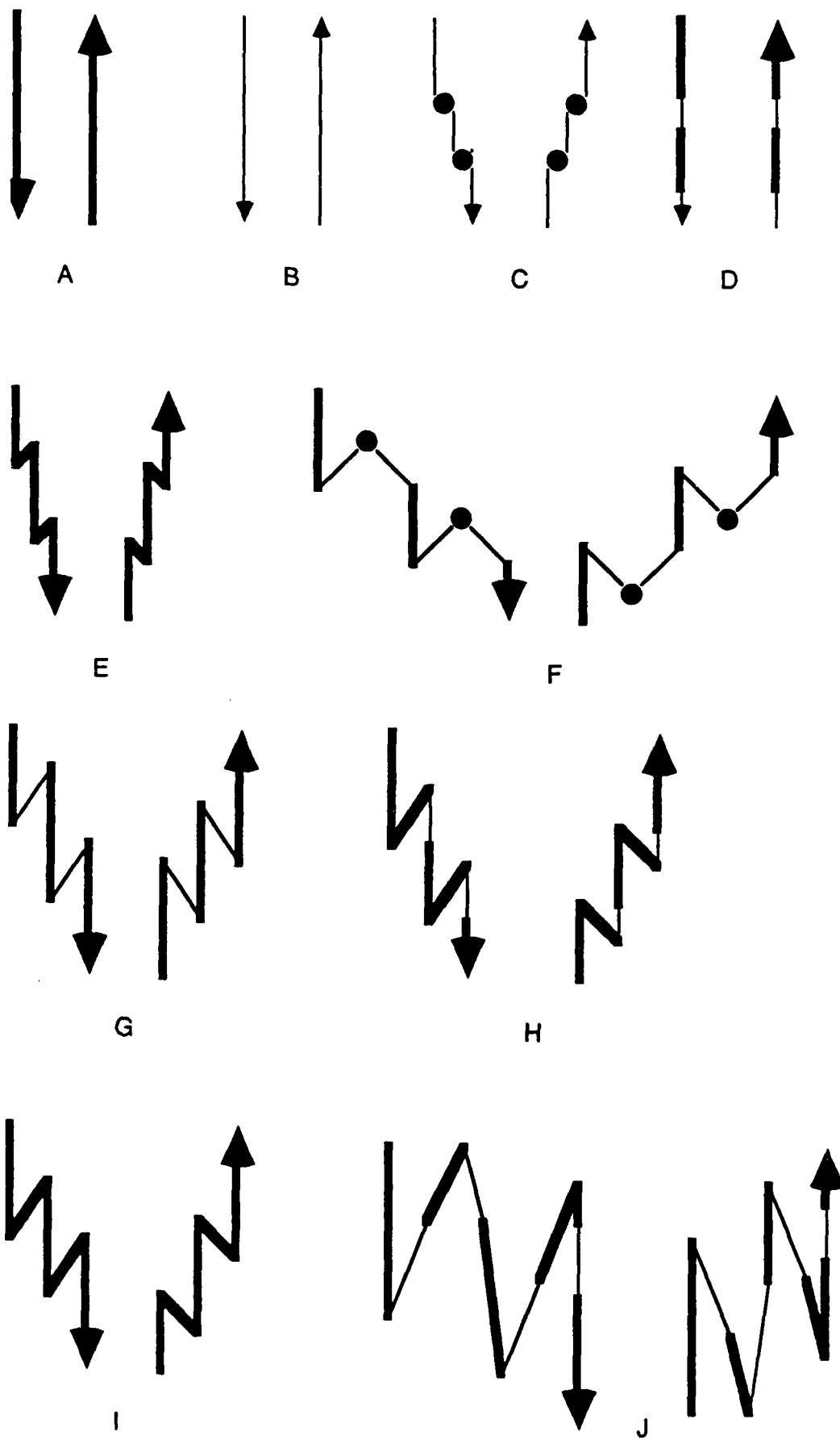
Figure 8. Frequency Distributions of Local Strategies for Type 2 Global Strategy

Local Strategies for Type 2 - ESL

■	A
▨	B
▒	C
▧	D
□	E
■	F+G+H+I
☰	J

Total strategies = 78
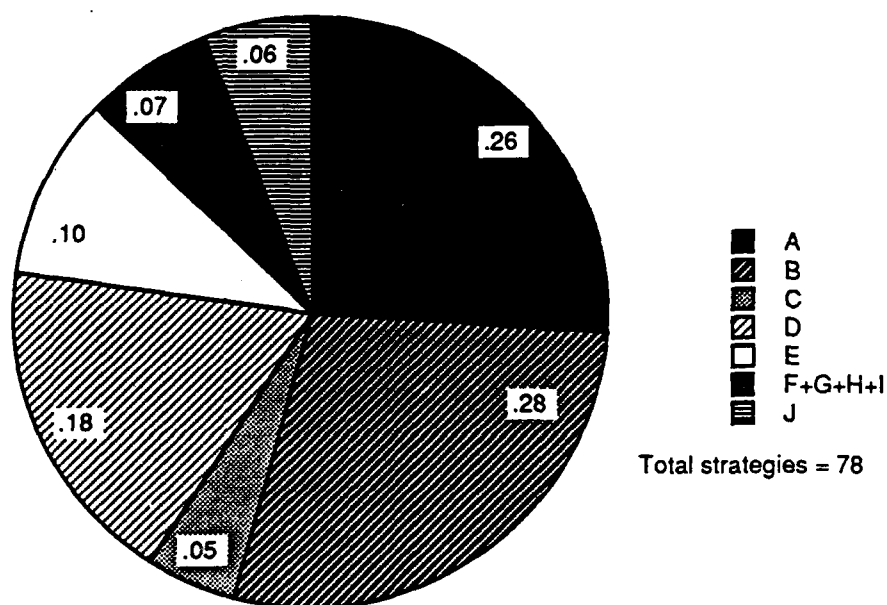
Local Strategies for Type 2 - Native English

■	A
▨	B
▒	C
▧	D
□	E
■	F+G+H+I
☰	J

Total strategies = 64
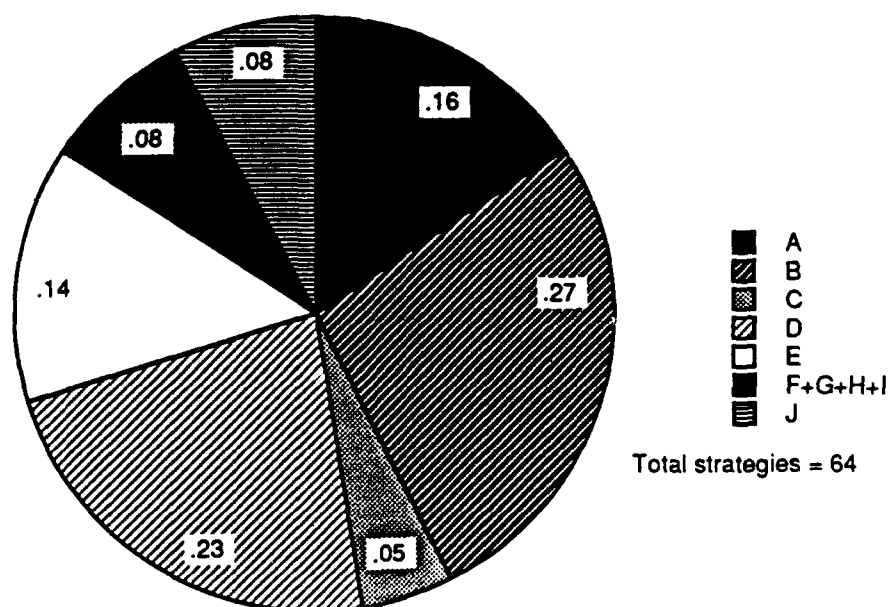
Figure 9. Frequency Distributions of Local Strategies for Type 3 Global Strategy

Local strategies for Type 3 - ESL

Before reaching the end

■ A
▨ C+D
▨ E
▨ F
□ G+H+I
■ J

Total strategies = 154
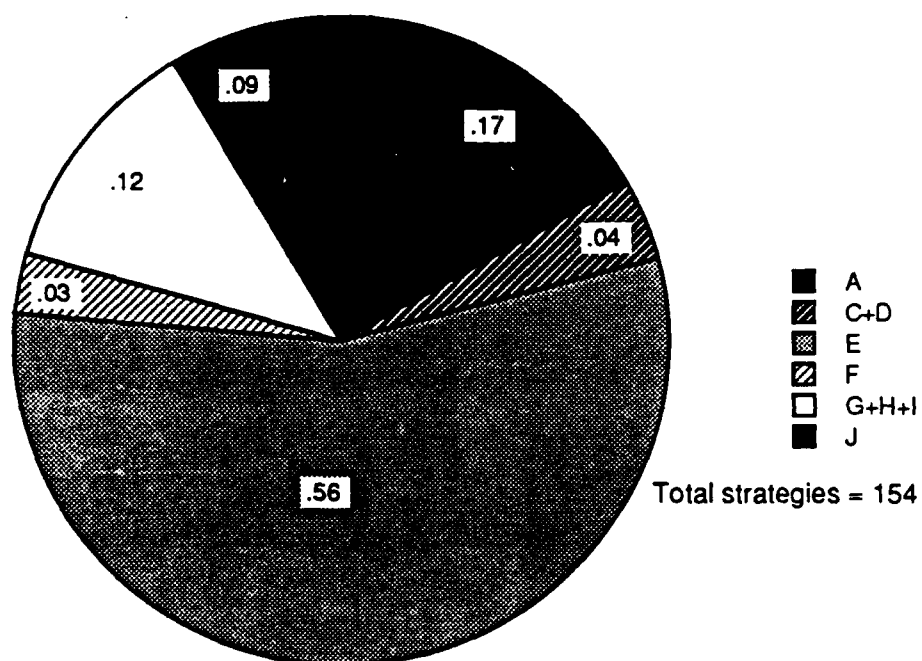
Local strategies for Type 3 - ESL

After first time through

■ A
▨ C+D
▨ E
▨ F
□ G+H+I
■ J
▤ B

Total strategies = 75
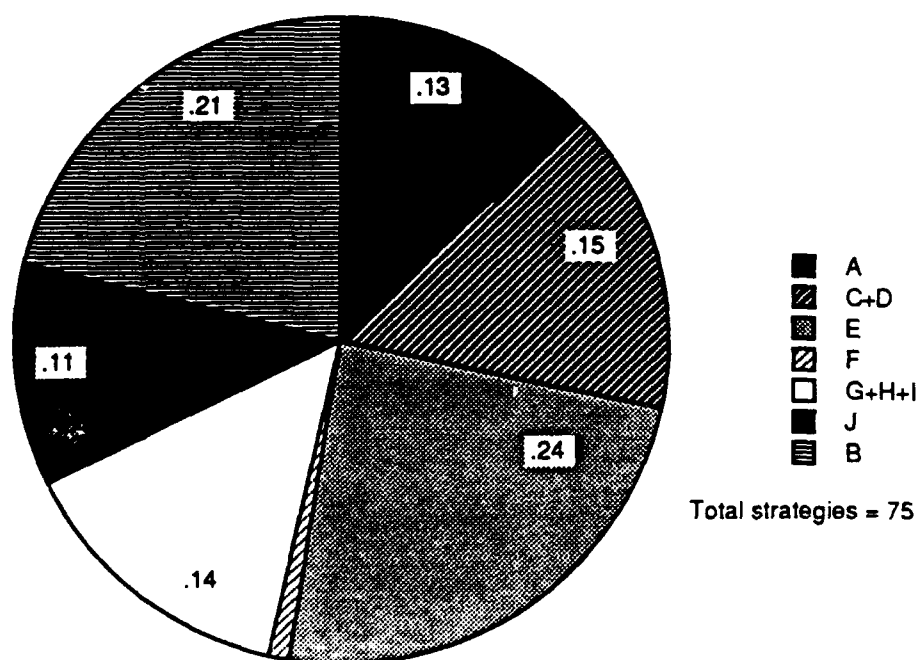
Figure 10. Sentence Types that Initiated Direction Changes for Type 2 Global Strategy

Sentences that initiate direction change

Type 2 - ESL

.41
.33
.12
.13

- ■ Introduction
- ▨ Topic
- ▦ Target
- ▨ Elaboration
- ☐ Conclusion

Total = 104
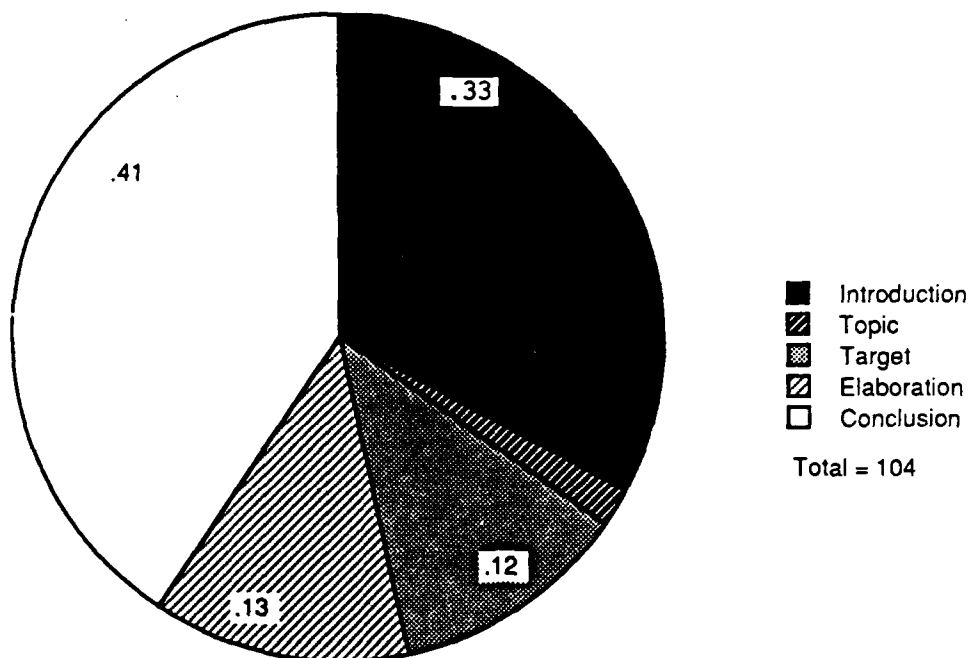
Sentences that initiate direction change

Type 2 - Native English

.42
.27
.07
.12
.12

- ■ Introduction
- ▨ Topic
- ▦ Target
- ▨ Elaboration
- ☐ Conclusion

Total = 83
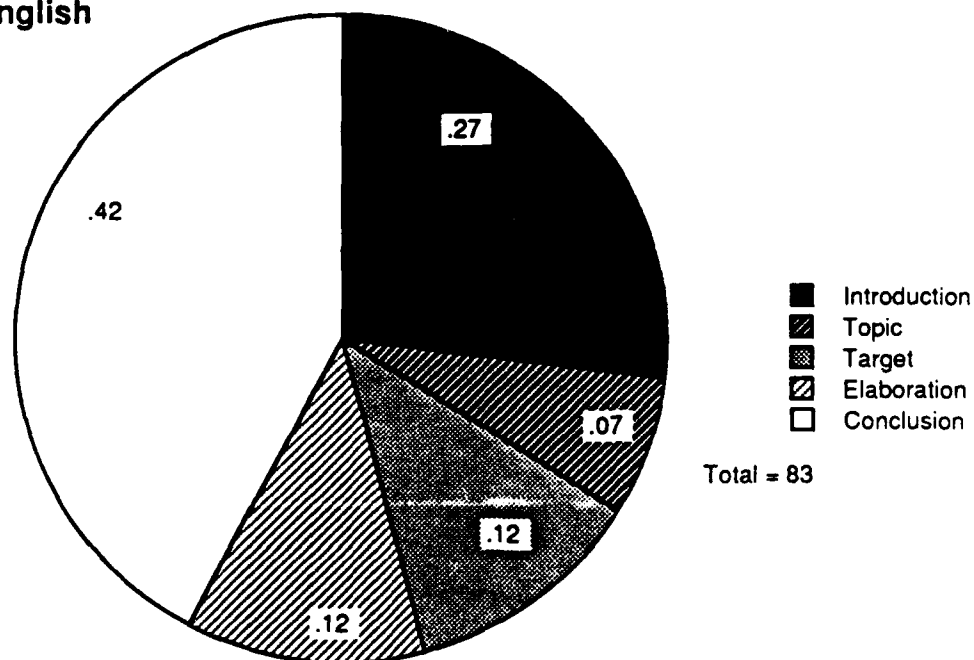
Figure 11. Sentences that Initiated Direction Change Type 3 (Before getting to the
end once)

Sentences that initiate direction change

Type 3, Before - ESL

- Introduction
- Topic
- Target
- Elaboration
- Conclusion

Total = 288

Sentences that initiate direction change
Type 3, Before - Native English

- Introduction
- Topic
- Target
- Elaboration
- Conclusion

Total = 236
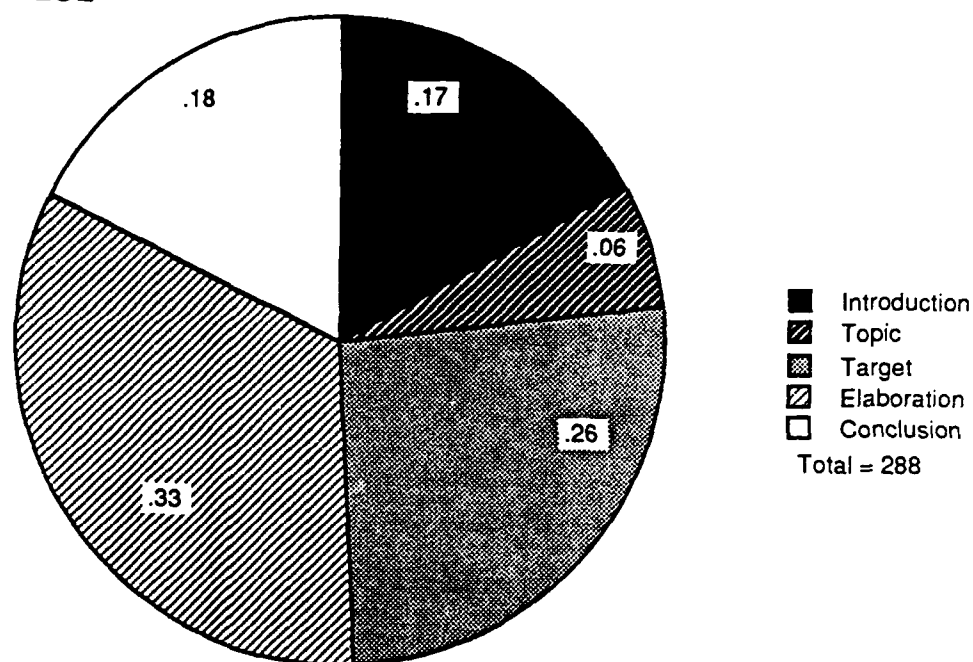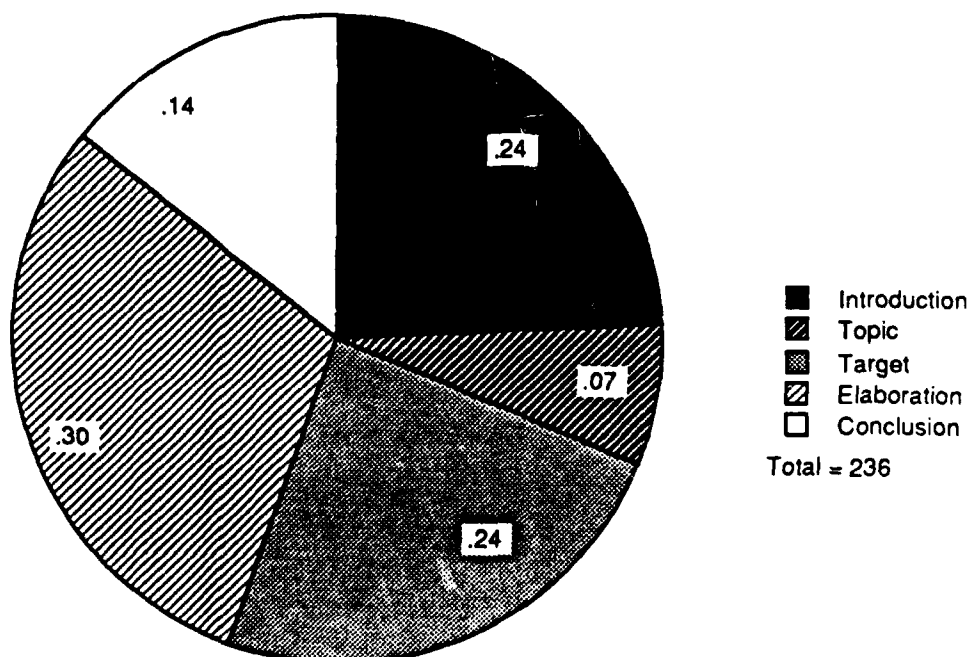
Figure 12. Sentences that Initiated Direction Change Type 3 (After getting to the end once)

Sentence that initiate direction change

Type 3, After - ESL

■	Introduction
▨	Topic
▩	Target
▨	Elaboration
□	Conclusion

Total = 75
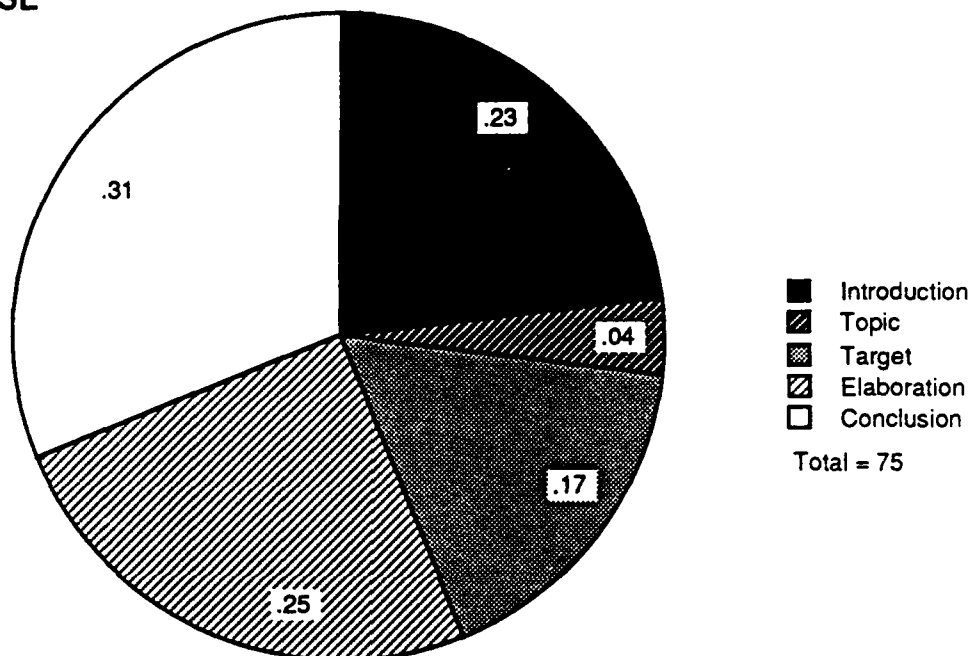
Sentence that initiate direction change

Type 3, After - Native English

■	Introduction
▨	Topic
▩	Target
▨	Elaboration
□	Conclusion

Total = 48
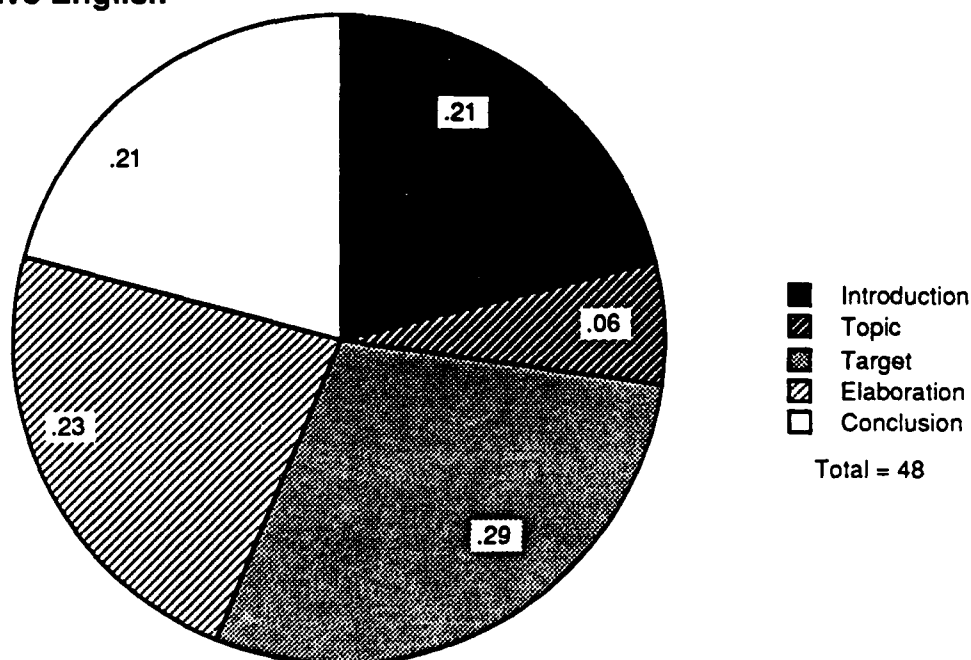
Figure 13. Sentences Strategically Read for Type 3 Global Strategy (Before end)

Sentences read to strategically

Type 3, Before - ESL

- ■ Introduction
- ▨ Topic Sentence
- ▩ Target Points
- ▨ Elaborations
- ☐ Conclusion

Total = 91

Sentences read to strategically

Type 3, Before - Native English

- ■ Introduction
- ▨ Topic Sentence
- ▩ Target Points
- ▨ Elaborations
- ☐ Conclusion

Total = 84
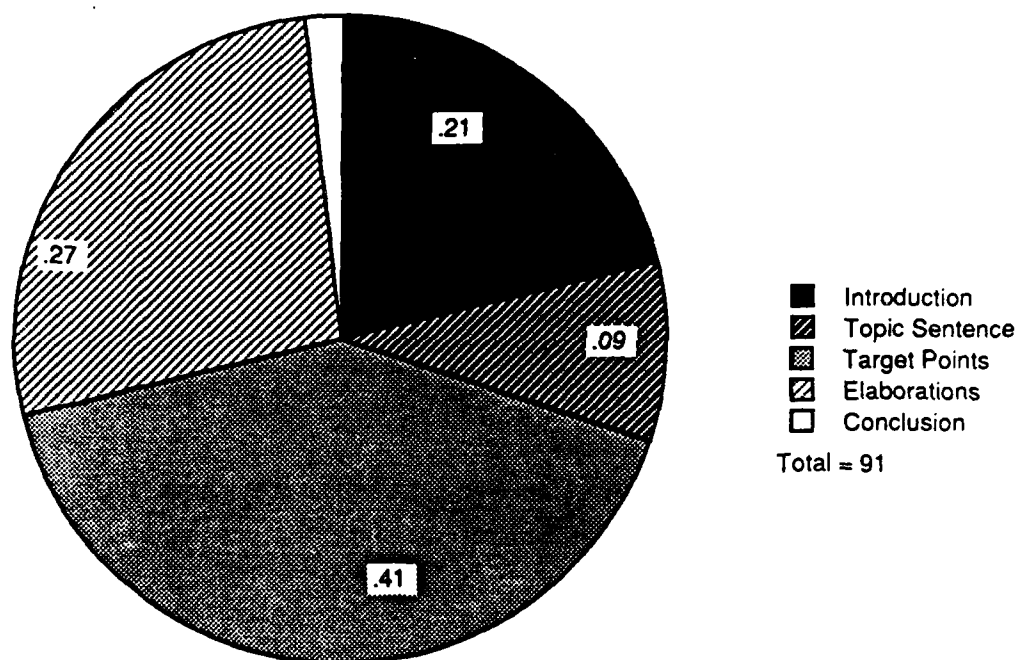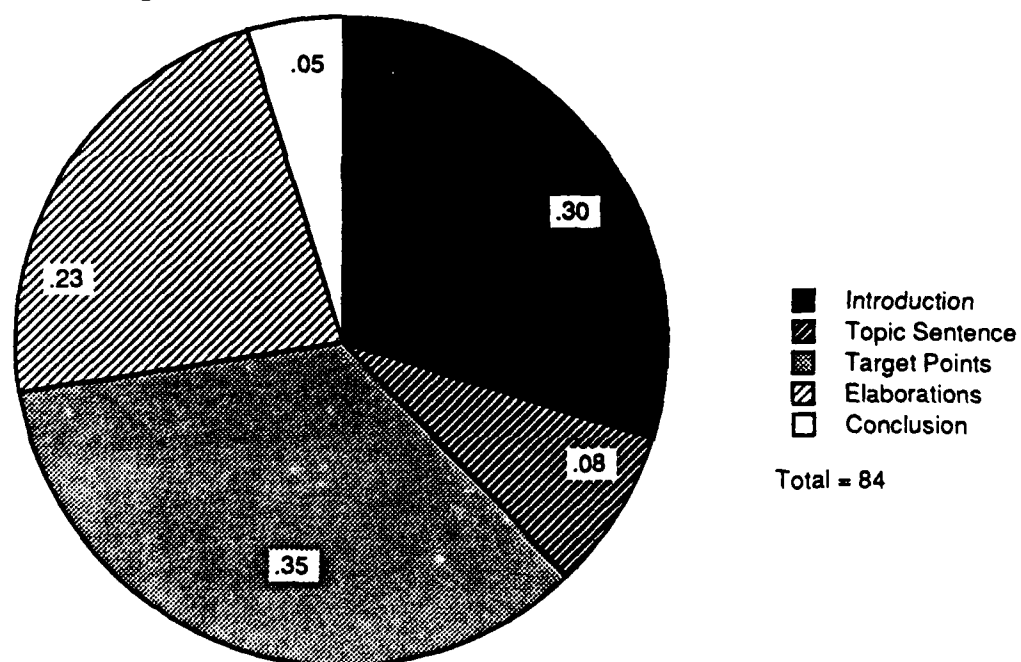
Dr. Phillip L. Ackerman
University of Minnesota
Department of Psychology
Minneapolis, MN 55455

Dr. Meryl S. Baker
Navy Personnel R & D Center
San Diego, CA 92152-6800

Dr. Jeff Bonar
Learning R&D Center
University of Pittsburgh
Pittsburgh, PA 15260

Dr. Beth Adelson
Department of Computer Science
Tufts University
Medford, MA 02155

Dr. Eva L. Baker
Ctr. for the Study of Evaluation
145 Moore Hall, UCLA
Los Angeles, CA 90024

Dr. Gordon H. Bower
Department of Psychology
Stanford University
Stanford, CA 94306

AFOSR,
Life Sciences Directorate
Bolling Air Force Base
Washington, DC 20332

prof. dott. Bruno G. Bara
Unita di ricerca di intelligenza artificiale
Universita di Milano
20122 Milano - via F Sforza 23 ITALY

Dr. Robert Breaux
Code N-095R
Naval Training Systems Center
Orlando, FL 32813

Dr. Robert Ahlers
Human Factors Lab., Code N711
Naval Training Systems Center
Orlando, FL 32813

Dr. William M. Bart
Dept. of Ed. Psych., 330 Burton Hall
178 Pilsbury Dr., S.E.
Minneapolis, MN 55455

Dr. Shirley Brice Heath
School of Education
Stanford University
Stanford, CA 94305

Dr. Ed Aiken
Navy Personnel R&D Center
San Diego, CA 92152-6800

Leo Beltracchi
U. S. Nuclear Regulatory Comm.
Washington, DC 20555

Dr. John S. Brown
XEROX Palo Alto Research Center
3333 Coyote Hill Road
Palo Alto, CA 94304

Dr. John R. Anderson
Department of Psychology
Carnegie-Mellon University
Pittsburgh, PA 15213

Dr. Mark H. Bickhard
University of Texas
EDB 504 Ed. Psych
Austin, TX 78712

Dr. Ann Brown
Ctr for the Study of Reading
51 Gerty Drive, Univ of Illinois
Champaign, IL 61280

Dr. James Anderson
Brown University
Center for Neural Science
Providence, RI 02912

Dr. Gautam Biswas
Department of Computer Science
University of South Carolina
Columbia, SC 29208

Dr. Bruce Buchanan
Computer Science Department
Stanford University
Stanford, CA 94305

Dr. Steve Andriole
George Mason U/Info Tech & Eng
4400 University Dr.
Fairfax, VA 22030

Dr. John Black
Teachers College, Columbia Univ.
525 West 121st Street
New York, NY 10027

Maj. Hugh Burns
AFHRL/IDE
Lowry AFB, CO 80230-5000

Dr. Gary Aston-Jones
Dept. of Biology, N.Y.U.
1009 Main Bldg., Wasnington Sq.
New York, NY 10003

Dr. R. Darrell Bock
University of Chicago, NORC
6030 South Ellis
Chicago, IL 60637

Dr. Patricia A. Butler
CERI
555 New Jersey Avenue, NW
Washington, DC 20208

Dr. Patricia Baggett
Dept. of Psych., Box 345
University of Colorado
Boulder, CO 80309

Dr. Sue Bogner
Army Research Institute. (PERI-SF)
5001 Eisenhower Avenue
Alexandria, VA 22333-5600

Dr. Joseph C. Campione
Ctr. for the Study of Reading
51 Gerty Dr., Univ. of Illinois
Champaign, IL 61820

Department
of Computer Science
Naval Postgraduate School
Monterey, CA 93940

Dr. Richard Duran
School of Education
University of California
Santa Barbara, CA 93106

Dr. Paul Feltovich
So Illinois Univ, Sch of Med
Med Educ Dept. P.O. Box ...
Springfield, IL 62708

Dr. Sharon Derry
Department of Psychology
Florida State University
Tallahassee, FL 32303

Dr. John Ellis
Navy Personnel R&D Center
San Diego, CA 92252

Mr. Wallace Feurzeig
Ed Tech Ctr, Bolt Beranek & Newman
10 Moulton Street
Cambridge, MA 02238

Director
Manpower and Personnel Lab
NPRDC (Code 06)
San Diego, CA 92152-6800

Dr. Susan Embretson
University of Kansas
Psych. Dept., 426 Fraser
Lawrence, KS 66045

Dr. Gerhard Fischer
Department of Psychology
University of Colorado
Boulder, CO 80309

Director
Training Laboratory
NPRDC (Code 05)
San Diego, CA 92152-6800

Dr. Randy Engle
Department of Psychology
University of South Carolina
Columbia, SC 29208

Fleet Support Office,
NPRDC (Code 301)
San Diego, CA 92152-6800

Director, Human Factors
& Organizational Systems Lab
NPRDC (Code 07)
San Diego, CA 92152-6800

Dr. Susan Epstein
Hunter College
144 S. Mountain Avenue
Montclair, NJ 07042

J. D. Fletcher
9931 Corsica Street
Vienna, VA 22180

Dr. Andrea A. diSessa
School of Education, EMST
University of California
Berkeley, CA 94720

ERIC Facility
Acquisitions
4833 Rugby Avenue
Bethesda, MD 20014

Dr. Linda Flower
Carnegie-Mellon University
Department of English
Pittsburgh, PA 15213

Dr. R. K. Dismukes
Associate Director for Life Sciences
AFOSR, Bolling AFB
Washington, DC 20332

Dr. K. Anders Ericsson
University of Colorado
Department of Psychology
Boulder, CO 80309

Dr. Kenneth D. Forbus
Dept of Comp Sci, U of Illinois
1304 West Springfield Avenue
Urbana, IL 61801

Dr. Stephanie Doan
Code 6021
Naval Air Development Center
Warminster, PA 18974-5000

Dr. Jean Claude Falmagne
Department of Psychology
New York University
New York, NY 10003

Dr. Barbara A. Fox
University of Colorado
Department of Linguistics
Boulder, CO 80309

Dr. Emanuel Donchin
University of Illinois
Department of Psychology
Champaign, Il 61820

Dr. Beatrice J. Farr
Army Research Institute
5001 Eisenhower Avenue
Alexandria, VA 22333

Dr. John R. Frederiksen
Bolt Beranek & Newman
50 Moulton Street
Cambridge, MA 02138

Dr. Thomas M. Duffy
Communications Design Center
CMU, Schenley Park
Pittsburgh, PA 15213

Dr. Pat Federico
Code 511.
NPRDC
San Diego, CA 92152-6800

Dr. Norman Frederiksen
Educational Testing Service
Princeton, NJ 08541

Dr. Michael Friendly
Psych Dept, York University
Toronto Ontario
CANADA M3J 1P3

Dr. Wayne Gray
Army Research Institute
5001 Eisenhower Avenue
Alexandria, VA 22333

Professor John R. Hayes
Carnegie-Mellon University
Dept of Psychology, Schenley Park
Pittsburgh, PA 15213

Julie A. Gadsden
Info Tech and Applications Div
Admiralty Research Est
Portsdown, Portsmouth PO6 4AA U.K.

Dr. James G. Greeno
School of Education
Stanford University
Stanford, CA 94305

Dr. Barbara Hayes-Roth
Dept of Computer Science
Stanford University
Stanford, CA 94305

Dr. Michael Genesereth
Stanford University
Computer Science Department
Stanford, CA 94305

Dr. Dik Gregory
Behavioral Sciences Division
Admiralty Research Est.
Teddington, Middlesex ENGLAND

Dr. Frederick Hayes-Roth
Teknowledge
525 University Avenue
Palo Alto, CA 94301

Dr. Dedre Gentner
Dept of Psych, U of Illinois
603 E Daniel Street
Champaign, IL 61820

Dr. Gehard Grossing
Atominstitut
Schuttelstrasse 115
Vienna, AUSTRIA a-1020

Dr. Joan I. Heller
505 Haddon Road
Oakland, CA 94606

Dr. Robert Glaser
University of Pittsburgh LRDC
3939 O'Hara Street
Pittsburgh, PA 15260

Prof. Edward Haertel
School of Education
Stanford University
Stanford, CA 94305

Dr. Jim Hollan
Intelligent Systems Group
Inst for Cog Sci (C-015), UCSD
La Jolla, CA 92093

Dr. Arthur M. Glenberg
WJ Brogden Psych Bldg
1202 W Johnson St, U of Wisconsin
Madison, WI 53706

Dr. Henry M. Halff
Halff Resources, Inc.
4918 33rd Road, North
Arlington, VA 22207

Dr. Melissa Holland
ARI for the Behavioral and Soc Sci
5001 Eisenhower Ave.
Alexandria, VA 22333

Dr. Sam Glucksberg
Dept of Psych, Green Hall
Princeton University
Princeton, NJ 08540

Dr. Ronald K. Hambleton
Prof of Ed and Psych
U of Mass at Amherst, Hills House
Amherst, MA 01003

Dr. Keith Holyoak
Human Performance Center
U of Michigan, 330 Packard Rd.
Ann Arbor, MI 48109

Dr. Susan Goldman
University of California
Santa Barbara; CA 93106

Steve Harnad, Editor
The Behavioral and Brain Sciences
20 Nassau Street, Suite 240
Princeton, NJ 08540

Ms. Julia S. Hough
Lawrence Erlbaum Associates
6012 Greene Street
Philadelphia, PA 19144

Dr. Sherrie Gott
AFHRL/MODJ
Brooks AFB, TX 78235

Dr. Wayne Harvey
SRI International
333 Ravenswood Ave, Rm B-S324
Menlo Park, CA 94025

Dr. James Howard, Dept of Psych
Human Performance Lab.
Catholic University of America
Washington, DC 20064

Dr. T. Govindaraj
Georgia Institute of Technology
Sch of Industrial & Syst Eng
Atlanta, GA 30332

Dr. Reid Hastie
Northwestern University
Department of Psychology
Evanston, IL 60201

Dr. Earl Hunt
Department of Psychology
University of Washington
Seattle, WA 98105

Dr. Ed Hutchins
Intelligent Systems Group
Inst for Cog Sci (C-015), UCSD
La Jolla, CA 92093

Dr. Douglas A. Jones
Thatcher Jones Assoc.
P.O. Box 6640, 10 Trafalgar Ct.
Lawrenceville, NJ 08648

Dr. Peter Kincaid
Training Analysis & Eval Group
Department of the Navy
Orlando, FL 32913

Dr. Barbara Hutson
Virginia Tech Graduate Center
2990 Telestar Ct.
Falls Church, VA 22042

Dr. Marcel Just
Carnegie-Mellon University
Dept of Psych, Schenley Park
Pittsburgh, PA 15213

Dr. Walter Kintsch
Dept of Psych. Campus Box 345
University of Colorado
Boulder, CO 80309

Dr. Barbel Inhelder
University of Geneva
Geneva SWITZERLAND 12U-4

Dr. Daniel Kahneman
The U of BC, Dept of Psych
=154-2053 Main Mall
Vancouver, BC CANADA V6T 1Y7

Dr. David Klahr
Carnegie-Mellon University
Dept of Psych, Schenley Park
Pittsburgh, PA 15213

Dr. Dillon Inouye
WICAT Education Institute
Provo, UT 84057

Dr. Ruth Kanfer
Dept of Psych, Elliot Hall
75 E River Rd, U of Minnesota
Minneapolis, MN 55455

Dr. Mazie Knerr
Training Research Div. HumRRC
1100 S. Washington
Alexandria, VA 22314

Dr. Alice Isen
Department of Psychology
University of Maryland
Catonsville, MD 21228

Dr. Mary Grace Kantowski
University of Florida, Math Ed
359 Norman Hall
Gainesville, FL 32611

Dr. Janet L. Kolodner
Georgia Institute of Technology
School of Info & Comp Sci
Atlanta, GA 30332

Dr. Robert Jannarone
Department of Psychology
University of South Carolina
Columbia, SC 29208

Dr. Milton S. Katz
Army Research Institute
5001 Eisenhower Avenue
Alexandria, VA 22333

Dr. Stephen Kosslyn
Harvard U, 1236 William James Hall
33 Kirkland St.
Cambridge, MA 02138

Dr. Claude Janvier, Directeur, CIRAI
Universite' du Quebec a Montreal
Montreal, Quebec H3C 3P8
CANADA

Dr. Frank Keil
Department of Psychology
Cornell University
Ithaca, NY 14853

Dr. Kenneth Kotovsky, Dept of Psych
Comm Coll of Allegheny Co
800 Allegheny Avenue
Pittsburgh, PA 15233

Dr. Robin Jeffries
Hewlett-Packard Laboratories
P.O. Box 10490
Palo Alto, CA 94303-0971

Dr. Wendy Kellogg
IBM T. J. Watson Research Center
P.O. Box 218
Yorktown Heights, NY 10598

Dr. David H. Krantz
2 Washington Square Village
Apt. #15J
New York, NY 10012

Dr. Robert Jernigan
Decision Resource Systems
5595 Vantage Point Road
Columbia, MD 21044

Dr. Dennis Kibler
Dept of Info and Comp Sci
University of California
Irvine, CA 92717

Dr. Benjamin Kuipers
U of TX at Austin, Dept of Comp Sci
T.S. Painter Hall 3.28
Austin, TX 78712

Margaret Jerome
c/o Dr. Peter Chandler
83, The Drive
Hove, Sussex UNITED KINGDOM

Dr. David Kieras
Tech Comm, Coll of Engineering
1223 E. Engineering Bldg, U of MI
Ann Arbor, MI 48109

Dr. David R. Lambert
Naval Ocean Syst Ctr, Code 411T
271 Catalina Boulevard
San Diego, CA 92152-6800

Dr. Pat Langley
Dept of Info & Comp Sci
University of California
Irvine, CA 92717

Dr. Clayton Lewis
Dept of Comp Sci, Campus Box 430
University of Colorado
Boulder, CO 80309

Dr. Barbara Means
Human Resources Research Org
1100 South Washington
Alexandria, VA 22314

Dr. Marcy Lansman
U of NC, Davie Hall 013A
The L.L. Thurstone Lab.
Chapel Hill, NC 27514

Library
Naval Training Systems Center
Orlando, FL 32813

Dr. Douglas L. Medin
Dept of Psych, U of Illinois
603 E. Daniel Street
Champaign, IL 61820

Dr. Jill Larkin
Carnegie-Mellon University
Department of Psychology
Pittsburgh, PA 15213

Library, NPRDC
 Code P201L
San Diego, CA 92152-6800

Military Asst for Training
 & Personnel Tech, OUSD (R & E)
 Room 3D129, The Pentagon
Washington, DC 20301-3080

Dr. Jean Lave
School of Social Sciences
University of California
Irvine, CA 92717

Dr. Jane Malin
Mail Code SR 111
NASA Johnson Space Center
Houston, TX 77058

Dr. George A. Miller
Dept of Psych, Green Hall
Princeton University
Princeton, NJ 08540

Dr. Robert Lawler
Information Sciences, FRL
GTE Labs, Inc., 40 Sylvan Road
Waltham, MA 02254

Dr. William L. Maloy
Chief of Naval Education
 and Training, Naval Air Station
Pensacola, FL 32508

Dr. William Montague
NPRDC Code 13
San Diego, CA 92152

Dr. Alan M. Lesgold
University of Pittsburgh, LRDC
3939 O'Hara Street
Pittsburgh, PA 15260

Dr. Sandra P. Marshall
Department of Psychology
San Diego State University
San Diego, CA 92182

Dr. Allen Munro
Behavioral Tech Labs - USC
1845 S. Elena Avenue, 4th Floor
Redondo Beach, CA 90277

Dr. Jim Levin
Dept of Ed Psych, 210 Ed Bldg
1310 So Sixth St
Champaign, IL 61810-6990

Dr. Manton M. Matthews
Department of Computer Science
University of South Carolina
Columbia, SC 29208

Dr. AllenNewell
Carnegie-Mellon University
Dept of Psych, Schenley Park
Pittsburgh, PA 15213

Dr. John Levine
University of Pittsburgh, LRDC
3939 O'Hara Street
Pittsburgh, PA 15260

Dr. Richard E. Mayer
Department of Psychology
University of California
Santa Barbara, CA 93106

Dr. Richard E. Nisbett
University of Michigan
Inst for Social Research, Rm. 5261
Ann Arbor, MI 48109

Dr. Michael Levine
Ed Psych, 210 Education Bldg
University of Illinois
Champaign, IL 61820

Dr. Joe McLachlan
Navy Personnel R&D Center
San Diego, CA 92152-6800

Dr. Mary Jo Nissen
University of Minnesota
N218 Elliott Hall
Minneapolis, MN 55455

Matt Lewis
Department of Psychology
Carnegie-Mellon University
Pittsburgh, PA 15213

Dr. James McMichael.
Assistant for MPT Research,
 Dev, and Studies, OP-01B7
Washington, DC 20370

Dr. Harold F. O'Neil, Jr.
School of Ed, WPH 801
Dept of Ed Psych & Tech - USC
Los Angeles, CA 90089-0031

Dr. Michael   Oberlin
Naval Training Systems Center
Code 711
Orlando, FL 32913-7100

Dr. Virginia E. Pendergrass
Code 711
Naval Training Systems Center
Orlando, FL 32813-7100

Dr. Joseph Psotka
ATTN: PERI-1C
Army Research Institute
5001 Eisenhower Avenue

Office of Naval Research
  Code 1142
800 North Quincy Street
Arlington, VA 22217-5000

Dr. David N. Perkins
Educational Technology Center
337 Gutman Library, Acpian Way
Cambridge, MA 02138

Psychologist
Office of Naval Research
  Branch Office, London, Box 39
FPO New York, NY 09510

Office of Naval Research
  Code 1133
800 North Quincy Street
Arlington, VA 22217-5000

Dr. Nancy Perry, Chief
Naval Ed. and Training, Code 00A2A
Naval Station Pensacola
Pensacola, FL 32508

Psychologist
Office of Naval Research
Liaison Office, Far East
APO San Francisco, CA 96503

Dr. Stellan Ohlsson
University of Pittsburgh, LRDC
3939 O'Hara Street
Pittsburgh, PA 15213

Dr. Steven Pinker
Deparment of Psychology
E10-018, MIT
Cambridge, MA 02139

Dr. Lynne Reder
Department of Psychology
Carnegie-Mellon University
Schenley Park

Dr. Judith Orasanu
Army Research Institute
5001 Eisenhower Avenue
Alexandria, VA 22333

Dr. Tjeerd Plomp
Twente U of Tech, Dept of Ed
P.O. Box 217, 7500 AE ENSCHEDE
THE NETHERLANDS

Dr. James A. Reggia
Sch of Med, Dept of Neurology
22 So Greene St, U of Maryland
Baltimore, MD 21201

Professor Seymour Papert
20C-109
MIT
Cambridge, MA 02139

Dr. Martha Polson
Dept of Psych, Campus Box 346
University of Colorado
Boulder, CO 80309

Dr. Fredenck Reif
Physics Department
University of California
Berkeley, CA 94720

Dr. James Paulson
Dept of Psych, Portland State U
P. O. Box 751
Portland, OR 97207

Dr. Peter Polson
University of Colorado
Department of Psychology
Boulder, CO 80309

Dr. Lauren Resnick
University of Pittsburgh, LRDC
3939 O'Hara Street
Pittsburgh, PA 15213

Dr. Roy Pea
Bank Street College of Education
610 West 112th Street
New York, NY 10025

Dr. Steven E. Poltrock
MCC, Echelon Bldg =1
9430 Research Blvd
Austin, TX 78759-6509

Dr. Gil Ricard
Mail Stop C04-14
Grumman Aerospace Corp.
Bethpage, NY 11714

Dr. Douglas Pearse
DCIEM
Box 2000
Downsview, Ontario CANADA

Dr. Harry E. Pople
U of Pittsburgh, Decision Syst Lab
1360 Scaife Hall
Pittsburgh, PA 15261

Mark Richer
1041 Lake Street
San Francisco, CA 94118

Dr. James W. Pellegrino
Department of Psychology
University of California
Santa Barbara, CA 93106

Dr. Mary C. Potter
Department of Psychology
MIT (E-10-032)
Cambridge, MA 02139

Dr. Mary S. Riley
Program in Cognitive Science
Ctr for Human Info Processing, UCSD
La Jolla, CA 92093

Dr. Linda G. Roberts, Sci, Ed,
& Trans Prog, Tech Assessment
Congress of the United States
Washington, DC 20510

Dr. Judith Segal
OERI
555 New Jersey Avenue, NW
Washington, DC 20208

Special Asst for Marine
Corps Matters, ONR Code COMC
800 North Quincy Street
Arlington, VA 22217-5000

Dr. William B. Rouse
Search Technology, Inc.
25-b Technology Park/Atlanta
Norcross, GA 30092

Dr. Sylvia A. S. Shafto
Department of Computer Science
Towson State University
Towson, MD 21204

Dr. Kathryn T. Spoehr
Brown University
Department of Psychology
Providence, RI 02912

Dr. David Rumelhart
Ctr. for Human Info. Processing
University of California
La Jolla, CA 92093

Dr. Ben Shneiderman
Department of Computer Science
University of Maryland
College Park, MD 20742

Dr. Robert Sternberg
Dept of Psych, Yale University
Box 11A, Yale Station
New Haven, CT 06520

Dr. Roger Schank
Comp Sci Dept, Yale University
P.O. Box 2158
New Haven, CT 06520

Dr. Lee Shulman
Stanford University
1040 Cathcart Way.
Stanford, CA 94305

Dr. Albert Stevens
Bolt Beranek & Newman, Inc.
10 Moulton Street
Cambridge, MA 02238

Dr. Walter Schneider
University of Pittsburgh, LRDC
3939 O'Hara Street
Pittsburgh, PA 15260

Dr. Robert Siegler
Carnegie-Mellon University
Dept of Psych, Schenley Park
Pittsburgh, PA 15213

Dr. Thomas Sticht
Navy Personnel R&D Center
San Diego, CA 92152-6800

Dr. Alan H. Schoenfeld
Department of Education, EMST
University of California
Berkeley, CA 94720

Dr. Derek Sleeman
Stanford University
School of Education
Stanford, CA 94305

Dr. John Tangney
AFOSR/NL
Bolling AFB, DC 20332

Dr. Janet Schofield
University of Pittsburgh, LRDC
3939 O'Hara Street
Pittsburgh, PA 15260

Dr. Edward E. Smith
Bolt Beranek & Newman, Inc.
50 Moulton Street
Cambridge, MA 02138

Dr. Kikumi Tatsuoka
CERL
252 Engineering Research Lab.
Urbana, IL 61801

Karen A. Schriver
Department of English
Carnegie-Mellon University
Pittsburgh, PA 15213

Dr. Richard E. Snow
Department of Psychology
Stanford University
Stanford, CA 94306

Technical Director, ARI
5001 Eisenhower Avenue
Alexandria, VA 22333

Dr. Judah L. Schwartz
MIT
20C-120
Cambridge, MA 02139

Dr. Elliot Soloway
Comp Sci Dept, Yale University
P.O. Box 2158
New Haven, CT 06520

Dr. Perry W. Thorndyke
FMC Corp., Central Engineering Labs
1185 Coleman Avenue, Box 580
Santa Clara, CA 95052

Dr. Marc Sebrechts
Department of Psychology
Wesleyan University
Middletown, CT 06475

Dr. Richard Sorensen
Navy Personnel R & D Center
San Diego, CA 92152-6800

Professor Chu Tien-Chen
Mathematics Department
National Taiwan University
Taipei, TAIWAN

Dr. Douglas Towne
Behavioral Technology Labs
1845 S. Elena Avenue
Recondo Beach, CA 90277

Dr. Robert A. Wisher
Army Inst. for the Beh. and Soc. Sci.
5001 Eisenhower Avenue
Alexandria, VA 22333

Dr. Kurt Van Lehn
Carnegie-Mellon University
Dept of Psych, Schenley Park
Pittsburgh, PA 15213

Mr. John H. Wolfe
Navy Personnel R & D Center
San Diego, CA 92152

Dr. Beth Warren
Bolt Beranek & Newman, Inc.
50 Moulton Street
Cambridge, MA 02133

Dr. Wallace Wulfeck, III
Navy Personnel R & D Center
San Diego, CA 92152-6800

Dr. Donald Weitzman
MITRE
1820 Dolley Madison Blvd.
MacLean, VA 22102

Dr. Joe Yasatuke
AFHRL/LRT
Lowry AFB, CO 80230

Dr. Keith T. Wescourt
FMC Corp, Central Engineering Labs
1185 Coleman Ave, Box 580
Santa Clara, CA 95052

Dr. Masoud Yazdani
Department of Computer Science
University of Exeter
Exeter EX4 4QL Devon, ENGLAND

Dr. Douglas Wetzel
Code 12
Navy Personnel R&D Center
San Diego, CA 92152-6800

Mr. Carl York
System Development Foundation
181 Lytton Avenue, Suite 210
Palo Alto, CA 94301

Dr. Barbara White
Bolt Beranek & Newman, Inc.
10 Moulton Street
Cambridge, MA 02238

Dr. Joseph L. Young
Memory & Cognitive Processes
National Science Foundation
Washington, DC 20550

Dr. Christopher Wickens
Department of Psychology
University of Illinois
Champaign, IL 61820

Dr. Heather Wild
Naval Air Development Center
Code 6021
Warminster, PA 18974-5000

Dr. Michael Williams
IntelliCorp
1975 El Camino Real West
Mountain View, CA 94040-2216